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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/579,211	05/12/2006	Toshihiko Shirasagi	SON-3162	6592

23353 7590 09/03/2008

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EXAMINER	
VERDERAME, ANNA L	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
09/03/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/579,211	SHIRASAGI ET AL.	
	Examiner	Art Unit	
	ANNA L. VERDERAME	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/12/2006 and 02/15/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 4-5,8 and 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Kouchiyama et al. JP-2003-315988 or Kouchiyama et al. WO 2004/034391(US 2005/0226999 used as an English language translation) in view of Miura et al. JP-02-029955 .

Kouchiyama et al. '988 teaches a method of microfabrication wherein a resist layer including an incomplete oxide of W or Mo is patterned to prescribed shapes by selectively exposing and developing the layer. The incomplete oxide of a transition metal refers to a compound deviated to a direction where the oxygen content is lower than that of a stoichiometric composition (abstract). The resist of the incomplete inorganic oxide is formed by sputtering a target of a transition metal in an atmosphere containing argon and oxygen. The degree of oxidation of the incomplete oxide is controlled by changing the oxygen content in the atmosphere. Varying the oxygen content, the addition of a second transition metal, and the provision of an interlayer are disclosed as methods for increasing the sensitivity of the resist (0059-0063).

Kouchiyama et al. '391 teaches a method for forming an optical disc master comprising the steps of forming an interlayer 101 and a resist layer 102 on a substrate 100, selectively exposing the resist, and developing the resist to

form a patterned master [(WO/page 10)/(0048-0049)]. The material of the resist includes an incomplete oxide of a transition metal such as Mo or W oxide. In order to form the resist layer composed of an incomplete oxide sputtering can be performed in an atmosphere containing oxygen with the metal target or alternatively can be formed in an argon atmosphere with a target of an incomplete metal oxide [(WO/page 13)/(0068)]. In order to control the sensitivity of the rest according to the present invention the oxygen content of the material is increased or decreased [(WO/page 19)/(0089)].

In example 1 a resist of an incomplete oxide of tungsten is formed on a glass substrate. The content of oxygen gas in the atmosphere of argon and oxygen was changed in order to control the degree of oxidation of the incomplete oxide [(WO/page 23)/(US/0108)]. The resist was then exposed and developed [(WO/ page 24)/(US/0107-0115)].

In example 2 a resist material of an incomplete oxide of W and Mo was used[(WO/page 25)/(US/0119-0120)]

Kouchiyama et al. '391 and '988 do not teach varying the oxygen concentration so that the concentration near the surface of the substrate is lower than the concentration at the surface of the resist. Further, both references do not teach the formation of concavo/convex structures of different depths.

Miura et al. teaches a method for forming an optical disc in which a bi-layer photoresist is formed. The upper layer of the bi-layer resist is formed to have a sensitivity which is at least 1.5 times greater than the sensitivity of the lower layer. Patterns having different depths are formed in the resist layer. The thickness of the upper layer corresponds to the thickness of the shallower pattern 4 and the thickness of the lower layer corresponds to the differences between the depth of the shallower patterns 4 and that of the deeper patterns 5(abstract).

It would have been obvious to one of ordinary skill in the art to modify the masters taught by Kouchiyama et al. '391 and '988 by forming a bi-layer resist wherein the sensitivity of the upper resist layer is at least 1.5 times greater than that of the lower resist based on the disclosure in Miura et al. and with the reasonable expectation of being able to form a pattern having different depths and being able to control the depths of the patterns. Further, it would have been obvious to adjust the sensitivity of the inorganic resist layers by adjusting the oxygen concentration based on the disclosure in Kouchiyama et al. '399 at (0089) and in Kouchiyama et al. '988 at (0059-0063). The resultant medium will have a higher concentration of oxygen near the surface of the resist and a lower concentration of oxygen near the surface of the substrate.

3. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kouchiyama et al. JP-2003-315988 or Kouchiyama et al. WO 2004/034391(US 2005/0226999 used as an English language translation) in view

of Saito et al. US 4,786,538 Yamada et al. 4,916,048, and Lee et al. JP-2001-344826(English translation provided) .

Kouchiyama et al. '988 teaches a method of microfabrication wherein a resist layer including an incomplete oxide of W or Mo is patterned to prescribed shapes by selectively exposing and developing the layer. The incomplete oxide of a transition metal refers to a compound deviated to a direction where the oxygen content is lower than that of a stoichiometric composition (abstract). The resist of the incomplete inorganic oxide is formed by sputtering a target of a transition metal in an atmosphere containing argon and oxygen. The degree of oxidation of the incomplete oxide is controlled by changing the oxygen content in the atmosphere. Varying the oxygen content, the addition of a second transition metal, and the provision of an interlayer are disclosed as methods for increasing the sensitivity of the resist (0059-0063).

Kouchiyama et al. '391 teaches a method for forming an optical disc master comprising the steps of forming an interlayer 101 and a resist layer 102 on a substrate 100, selectively exposing the resist, and developing the resist to form a patterned master [(WO/page 10)/(0048-0049)]. The material of the resist includes an incomplete oxide of a transition metal such as Mo or W oxide. In order to form the resist layer composed of an incomplete oxide sputtering can be performed in an atmosphere containing oxygen with the metal target or alternatively can be formed in an argon atmosphere with a target of an incomplete metal oxide [(WO/page 13)/(0068)]. In order to control the sensitivity

of the rest according to the present invention the oxygen content of the material is increased or decreased [(WO/page 19)/(US/0089)].

In example 1 a resist of an incomplete oxide of tungsten is formed on a glass substrate. The content of oxygen gas in the atmosphere of argon and oxygen was changed in order to control the degree of oxidation of the incomplete oxide [(WO/page 23)/(US/0108)]. The resist was then exposed and developed [(WO/ page 24)/(US/0107-0115)].

In example 2 a resist material of an incomplete oxide of W and Mo was used[(WO/page 25)/(US/0119-0120)]

Kouchiyama et al. '391 and '988 do not teach varying the oxygen concentration so that the concentration near the surface of the substrate is lower than the concentration at the surface of the resist. Further, both references do not teach the formation of concavo/convex structures of different depths.

Saito et al. teaches varying the oxygen content in the thickness direction of a photosensitive TeO_x film. Thereby the medium obtained may be extremely stable and has excellent adhesive properties between the substrate (abstract). A tellurium or tellurium suboxide layer and/or a tellurium dioxide layer are laminated or a tellurium dioxide layer and/or a tellurium or tellurium suboxide layer are laminated (2/28-41). See description of figure 1 and figure 2(2/60-65).

In example 4 a film is formed wherein a film of $TeO_{0.1}$ is formed near the surface of the substrate and the oxygen content is increased toward the surface

of the photosensitive layer. The surface of the photosensitive layer has a composition of TeO_2 (8/5-31).

Yamada et al. teaches photosensitive sub-oxide materials including WO_x, MoO_x, and TeO_x(abstract).

The teachings of Yamada et al. are used to show that the teaching to vary the oxygen content in a TeO_x film will likely produce the same results in WO_x and MoO_x films. Yamada et al. teaches that these films are interchangeable.

Lee et al. teaches a disc manufacturing method in which grooves and pits having different depths are formed by changing the power of the laser beam(abstract). See figures 2A-B.

It would have been obvious to modify the manufacturing method of Kouchiyama et al. '391 and '988 by varying the oxygen content in the inorganic photosensitive layer so that the concentration of oxygen at the surface of the resist layer is higher than that at the surface of the substrate or in which the oxygen content is higher at the surface of the substrate and lower at the surface of the resist based on the example of Saito et al. and based on the teaching of equivalence between TeO_x and MoO_x or WO_x by Yamada et al. and with the reasonable expectation of forming an extremely stable master having excellent adhesive properties between the substrate. Further, it would have been obvious to one of ordinary skill in the art to form concavo/convex structures having

different depths by changing the laser power based on the disclosure of Lee et al.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

-US 4,385,376- The surface of a Te oxide film is subjected to an oxidizing treatment

-US 4,150,398-Kojima et al. teaches the formation of structures having different depths in a photosensitive material by varying the beam intensity(6/18-34). See also figure 1.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna L. Verderame whose telephone number is (571)272-6420. The examiner can normally be reached on M-F 8A-4:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/
Supervisory Patent Examiner, Art Unit 1795

/A. L. V./
Examiner, Art Unit 1795